Metro Nashville
DISTRICT ENERGY SYSTEM

SE-1 Ron Lowe in the new Control Room

Operations Monitoring Report

June 2006

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Gresham, Smith and Partners

July 19, 2006

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SECTION 1 OPERATIONS

1.1 Sales and Performance – See Attached Charts

a. Steam sales for June are up 41.9%, or 3,495,846 pounds, compared to June last year and steam sendout is up by 33.52%, or 4,737,000 pounds for the same period. There were no heating degree days this year or last year. For this complete fiscal year, steam sales are 1.45% greater than last year, while heating degree days are down 10%.

b. Steam loss rate for June is 9,766 pph, up from 3,976 pph last month. The loss percentage is 37.3%, up from 12.2% last month. This month's loss rate is the second highest for the fiscal year. See Chart 2.

c. Total fuel usage was up 30.2% this month and is consistent with steam sendout being up 33.5%. Electricity used to produce steam for sendout dropped 34.9% from 3.97 kwh/mlb last June to 2.59 kwh/mlb this year. See Chart 5.

d. Condensate return remains about 1%. .

e. Chilled water sales for June are up 22.3% compared to June 2005. Chilled water losses increased to an average of 1188 tons from 1034 tons last year. There were 327 cooling degree days this year compared with 363 cooling degree days for last year. For the entire fiscal year, chilled water sales are up 11.7% and cooling degree days are up 43.4%.

f. Chiller electricity used to produce a ton-hr is down 7.0% at 0.73 kwh/tonhr compared to last year. Total electricity used to produce chilled water during this fiscal year is up 13.2% while sales for the period are up 22.3%.

g. City water for chilled water makeup and condenser water makeup is up 18% for the month while chilled water sendout is up 33.5%. Average daily city water makeup to the chilled water has leveled at 28,000 gallons for this month and the prior two months. This is about 3 to 4 times the expected loss rate.

1.2 Facility Walkthrough

A Facility Walkthrough was conducted this month. The EGF was host for plant tours in June as part of the IDEA Annual Conference and is in excellent condition.

SECTION 2 DISCUSSION COMMENTS

2.1 CEPS-DES Monitoring Review Meeting – 10 AM, CDT, June 17, 2006

Attendees: Harvey Gershman, Dave Seader, Tim Hestle, Eddie Wisdom, and Tony Mirabella

Review of June Operations Report

a. Reliability – The report describes an event on June 22 when all chillers tripped while attempting to put #5 chiller online. The cause was found to be a defective control board on the #5 chiller condenser inlet valve. The question is "How does a failed board on a chiller water valve shut down all the operating chillers?" There is a common control circuit for all ChW inlet valves. When one fails, it takes them all out. We are currently investigating separating these (put on 3 separate circuits after cooling season) to keep this from reoccurring.

b. Efficiency – The efficiency values in the Operating Report are in agreement with the values shown in Section 3 of this report.

c. Environmental, **Health and Safety** - OK

d. Personnel – Two open positions remain unfilled.

e. Training – OK

f. Facility Maintenance – Were the annual inspections performed on Boilers #1 and #3 performed by the insurance company and did the inspections disclose any required repairs? The inspections were conducted by Arise, a subcontractor to the insurance company. The boilers received a clean bill of health. No deficiencies were reported.

g. Customer Service

1. CJC Building – what was the chilled water supply and return pressure at the time of the problem? June 1st 135.5 psi supply – 130.1 psi return
   June 2nd 137 psi supply – 130.7 psi return
   June 6th 140 psi supply – 135.6 psi return
   June 7th 139.3 psi supply – 129.6 psi return
2. Library and Tennessee Towers (TT) – was the problem caused by the TT pump over pressurizing the chilled water return system? There is a problem with the way TN Towers is operating. Per design, they should never run more than 2 pumps & heat exchangers at one time. They are currently running all 3 pumps & heat exchangers. This is a problem in the control scheme. Siemens is supposed to be working to resolve. This occurrence is part of the startup process of the new heat exchangers and pump system, but it points to the need to make sure good communications exists between the TT building operators and the DES control room when operating set points are changed.

h. Sales and Marketing – OK

i. Energy Distribution System Maintenance

1. How many buildings, like the Sun Trust Bank, isolate the building from the steam system in the summer? Parkway Towers, Municipal Auditorium, 501 Bldg. & St. Mary's Church How do these buildings provide heat for domestic hot water? Electric water heaters
2. Per discussion with Tim Hestle, each of the State buildings steam consumption was estimated this month; however, the total State consumption was per the new common meter located in the AJ Building.
3. The 4th Ave tunnel fan was reported damaged. Has it been repaired? Not yet. We are in the process of getting price estimates. There are two fans at this location.

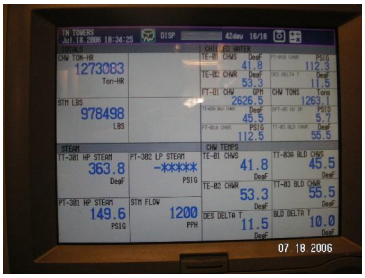
j. DES Projects

1. Following are some photos of the Tennessee Tower Decoupling Project taken on July 18, 2006

Heat Exchangers

Pumps

New Building Addition for Pumps and Heat Exchangers



Meter Screen
Note that the photo of the meter indicates a 3.7 degree spread between DES chilled water supply temperature and the building chilled water supply temperature. The design specification for the building heat exchanger is?
2 degrees

2. Customer Metering – There are now 8 out of 38 IT connections completed, permitting remote monitoring of customer load and system pressure and temperatures. These limited monitoring points reveal instances of negative pressure in the system and emphasize the urgency to complete the connection work and get on with the system hydraulic study.``````````````

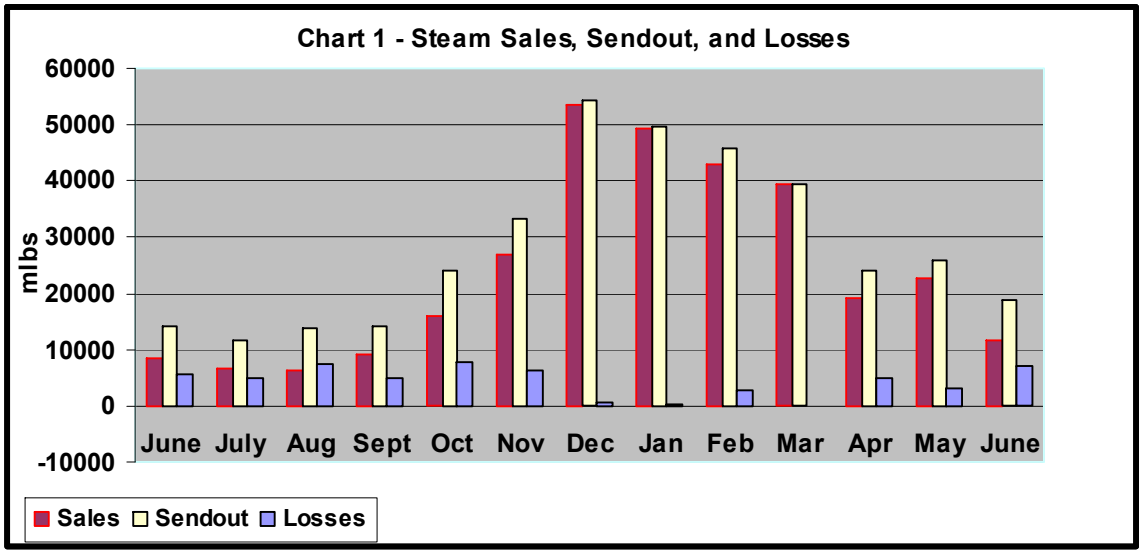
SECTION 3 STATISTICS

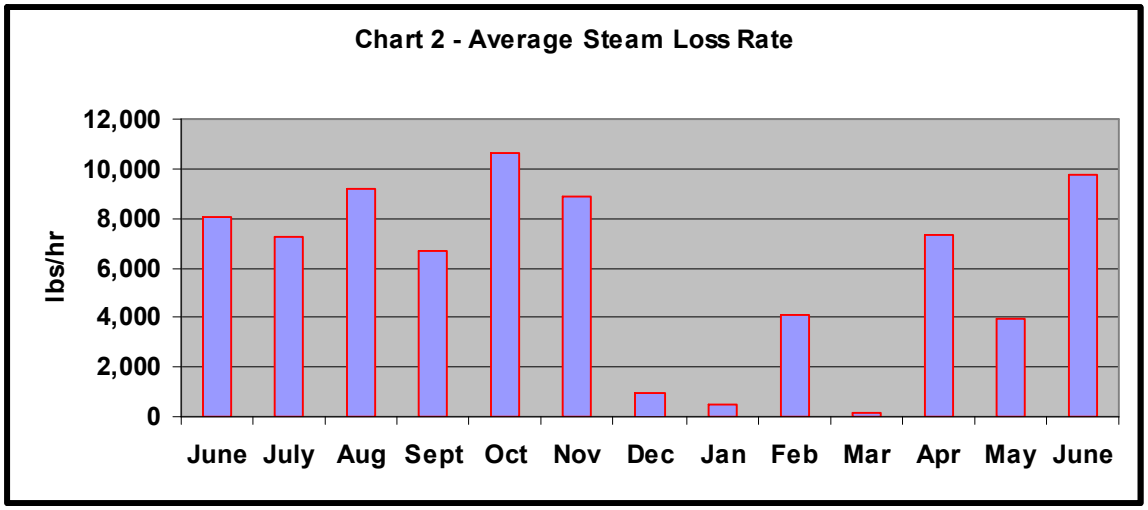
			One Month Ending			Year to Date			12 Months Ending
			This Year	Last Year	06vs05	This Year	Last year	06vs05	June 30, 2006
		number of days	30	30	0.00%	365	365	0.00%	365
Electric use		kwh	5,720,015	5,084,491	12.50%	48,209,474	42,591,378	13.19%	48,209,474
	chw	kwh	5,671,216	5,028,364	12.78%	47,323,128	41,739,955	13.38%	47,323,128
	steam	kwh	48,800	56,127	-13.05%	886,337	851,423	4.10%	886,337
						0	0		0
						0	0		0
Water Use		mgal	16,863	13,817	22.05%	157,393	121,835	29.19%	157,393
	chw	mgal	14,363	12,175	17.97%	111,495	88,572	25.88%	111,495
			842	0		6,826	1,855		6,826
			13,521	12,175		104,669	86,717		104,669
	steam	mgal	2,500	1,642	52.25%	45,898	33,232	38.11%	45,898
						0	0		0
total fuel		MMBTU	26,896	20,653	30.23%	517,691	479,160	8.04%	517,691
	Natural gas	MMBTU	26,896	20,653	30.23%	516,020	478,230	7.90%	516,020
	propane	MMBTU	0	0		1,671	930		1,671
						0	0		0
Condensate Return		mgal	2	37	-94.68%	163	3,825	-95.74%	163
		avg T - degrees F	155	155	0.00%	1,862	1,851	0.59%	155
Sendout						0	0		0
	steam	lbs	18,870,000	14,133,000	33.52%	354,779,000	327,618,000	8.29%	354,779,000
	chw	tonhrs	7,724,300	6,363,000	21.39%	62,554,400	55,907,100	11.89%	62,554,400
Sales						0	0		0
	steam	lbs	11,838,355	8,342,509	41.90%	304,333,779	299,988,960	1.45%	304,333,779
	chw	tonhrs	6,869,088	5,618,771	22.25%	52,304,033	46,846,558	11.65%	52,304,033
						0	0		0
						0	0		0
Sales Prior Year						0	0		0
	steam	lbs	8,342,509	9,441,756	-11.64%	325,840,493	317,561,094	2.61%	325,840,493
	chw	tonhrs	5,618,771	5,958,513	-5.70%	45,238,898	50,913,239	-11.15%	45,238,898

		One Month Ending This Year	Last Year	06vs05	Year to Date This Year	Last year	06vs05	12 Months Ending June 30, 2006
CALCULATIONS								
Gross ratios								
Steam								
KWH per klb sold	kwh/klb	4.12	6.73	-38.73%	2.91	2.84	2.61%	2.91
KWH per klb sendout	kwh/klb	2.59	3.97	-34.88%	2.50	2.60	-3.87%	2.50
lbs sendout per MMBTU	lbs/MMBTU	701.59	684.31	2.53%	685.31	683.73	0.23%	685.31
MMBTU per klb sendout	MMBTU/klb	1.43	1.46	-2.46%	1.46	1.46	-0.23%	1.46
MMBTU per klb sold	MMBTU/klb	2.27	2.48	-8.23%	1.70	1.60	6.50%	1.70
lbs sendout per kgal water	lbs/kgal	7,548	8,607	-12.31%	7,730	9,859	-21.59%	7,730
lbs makeup water	lbs	20,795,000	13,658,156	52.25%	381,779,564	276,423,776	38.11%	381,779,564
lbs condensate return	lbs	16,059	302,000	-94.68%	1,328,996	31,215,485	-95.74%	1,328,996
percentage condensate return	%	0	2	-96.02%	0	10	-96.07%	0
Guaranty makeup is less than	lbs	21,682,032	15,905,650	36.32%	406,467,505	340,862,892	19.25%	406,467,505
Actual makeup	lbs	20,795,000	13,658,156	52.25%	381,779,564	276,423,776	38.11%	381,779,564
Actual M/U to Guaranty M/U		0.96	0.86	11.69%	0.94	0.81	15.82%	0.94
Chilled Water								
kwh per tonhr sendout	kwh/tonhr	0.73	0.79	-7.09%	0.76	0.75	1.33%	0.76
kwh per tonhr sold	kwh/tonhr	0.83	0.89	-7.74%	0.90	0.89	1.55%	0.90
makeup water/tonhr sold	gal/tonhr	1.97	2.13	-7.80%	2.00	1.85	8.11%	2.00
Heating Degree Days								
This year	hdd	0	0	#DIV/0!	3,181	3538	-10.09%	3,181
Normal	hdd	2	2		3,677	3677		3,677
Last year	hdd	0	0	#DIV/0!	3,411	3312	2.99%	3,411
Cooling Degree Days					0	0		0
This year	cdd	327	363	-9.92%	2,101	1465	43.41%	2,101
Normal	cdd	321	321		1,652	1652		1,652
Last year	cdd	363	323	12.38%	1,494	1681	-11.12%	1,494

				06vs05	Year to Date This Year	Last year	06vs05	12 Months Ending June 30, 2006
Chilled Water Losses	**tonhr**	855,212	744,229	14.91%	10,250,367	9,060,542	13.13%	10,250,367
	tonhr/day	28,507	24,808	14.91%	28,083	24,823	13.13%	28,083
	tonhr/hr	1,188	1,034	14.91%	1,170	1,034	13.13%	1,170
CHW Loss percent		11.07%	11.70%		16.39%	16.21%		16.39%
Steam Losses	**pounds**	7,031,645	5,790,491	21.43%	50,445,221	27,629,040	82.58%	50,445,221
	pounds per day	234,388	193,016	21.43%	138,206	75,696	82.58%	138,206
	pounds per hour	9,766	8,042	21.43%	5,759	3,154	82.58%	5,759
Steam Loss Percent		37.26%	40.97%		14.22%	8.43%		14.22%

SECTION 4 CHARTS





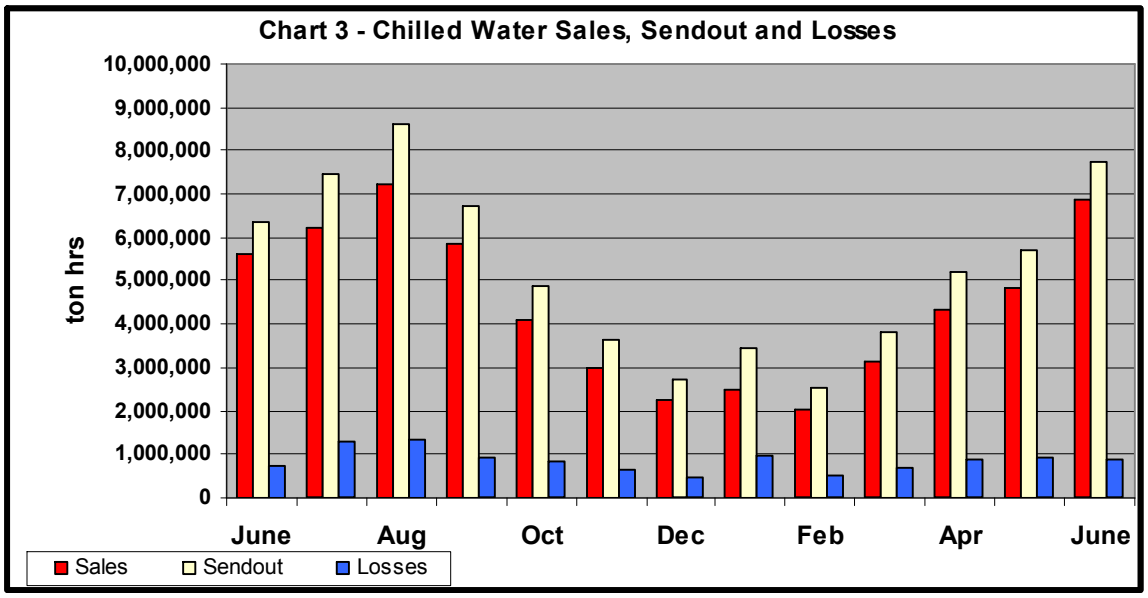


Chart 3 - Chilled Water Sales, Sendout and Losses
ton hrs
10,000,000
9,000,000
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
June
Aug
Oct
Dec
Feb
Apr
June
Sales
Sendout
Losses

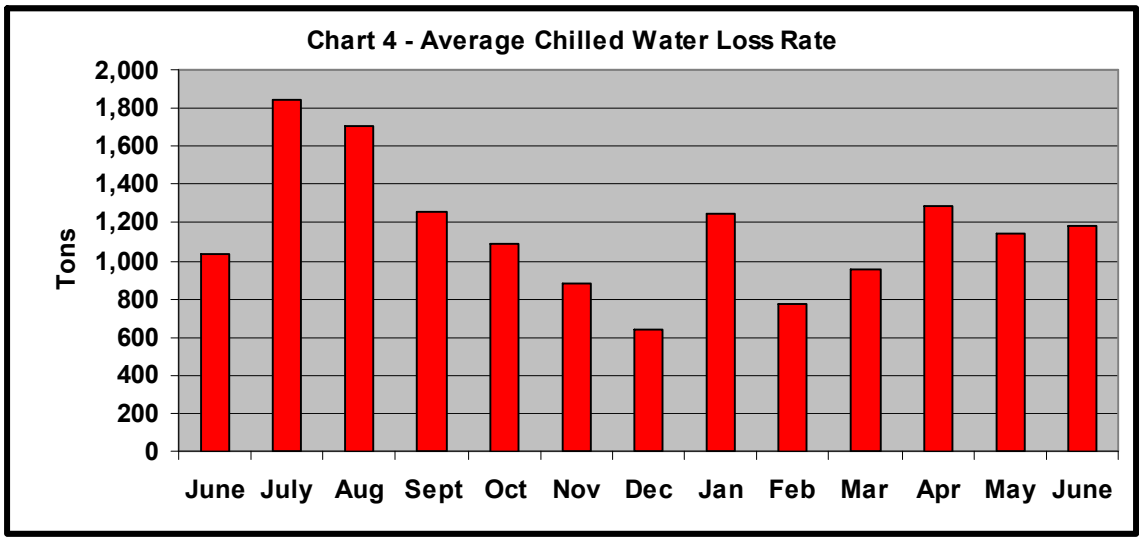


Chart 4 - Average Chilled Water Loss Rate
Tons
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
June
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June

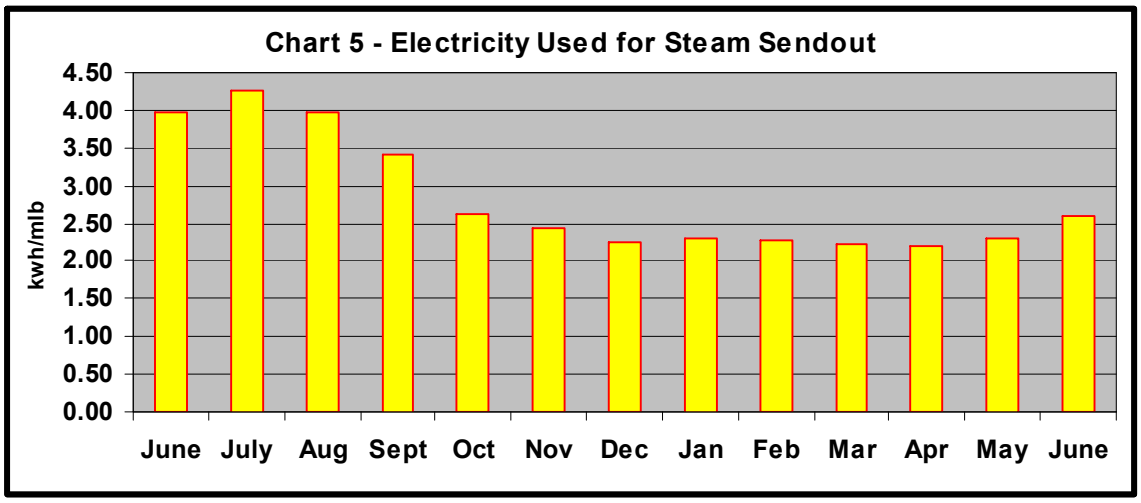


Chart 5 - Electricity Used for Steam Sendout
kwh/mlb
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
June July Aug Sept Oct Nov Dec Jan Feb Mar Apr May June

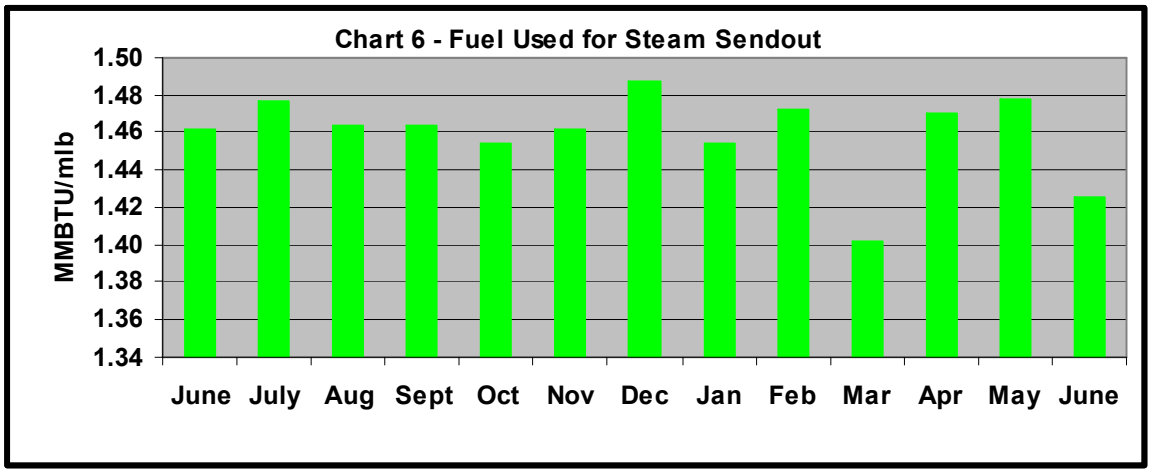


Chart 6 - Fuel Used for Steam Sendout
MMBTU/mlb
1.50
1.48
1.46
1.44
1.42
1.40
1.38
1.36
1.34
June July Aug Sept Oct Nov Dec Jan Feb Mar Apr May June

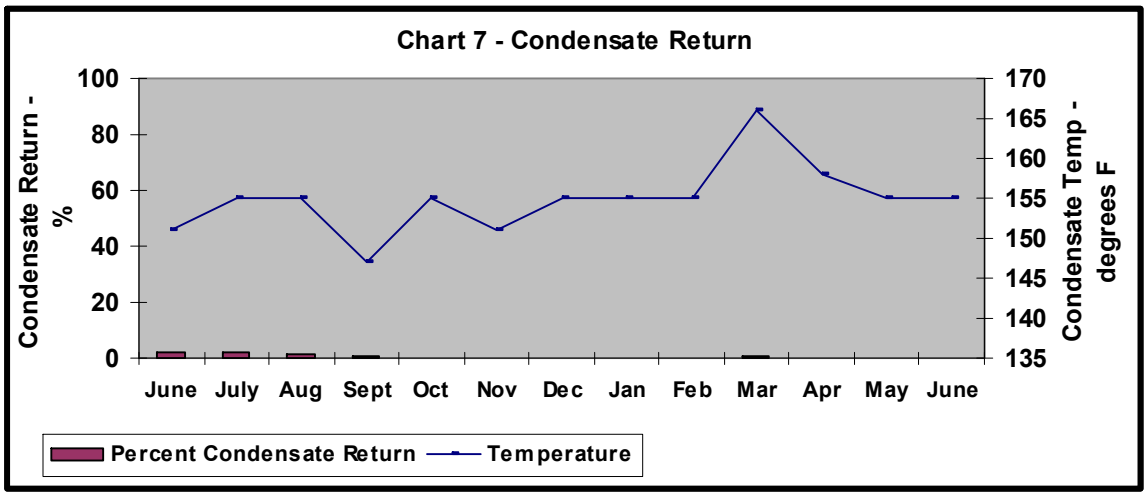


Chart 7 - Condensate Return
Condensate Return - %
100
80
60
40
20
0
170
165
160
155
150
145
140
135
Condensate Temp - degrees F
June July Aug Sept Oct Nov Dec Jan Feb Mar Apr May June
Percent Condensate Return
Temperature

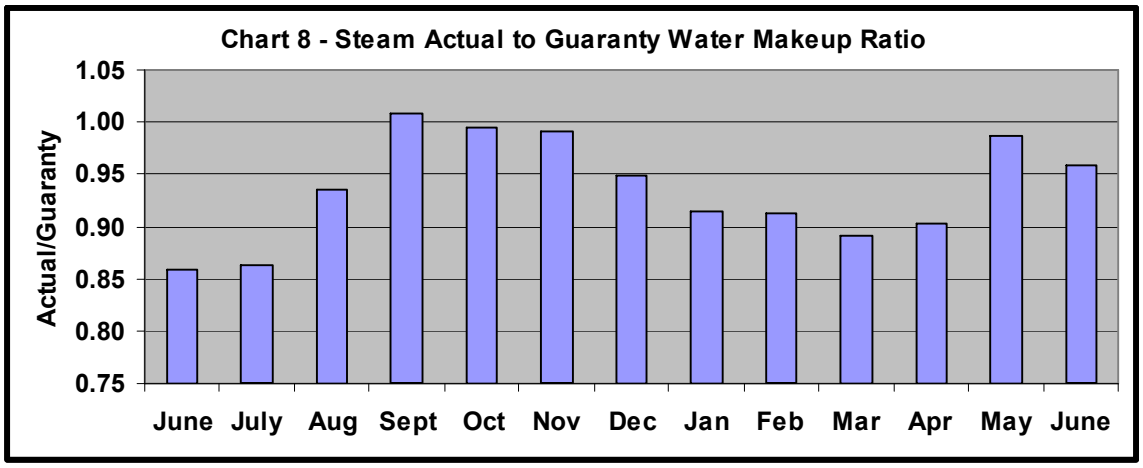


Chart 8 - Steam Actual to Guaranty Water Makeup Ratio
Actual/Guaranty
1.05
1.00
0.95
0.90
0.85
0.80
0.75
June July Aug Sept Oct Nov Dec Jan Feb Mar Apr May June

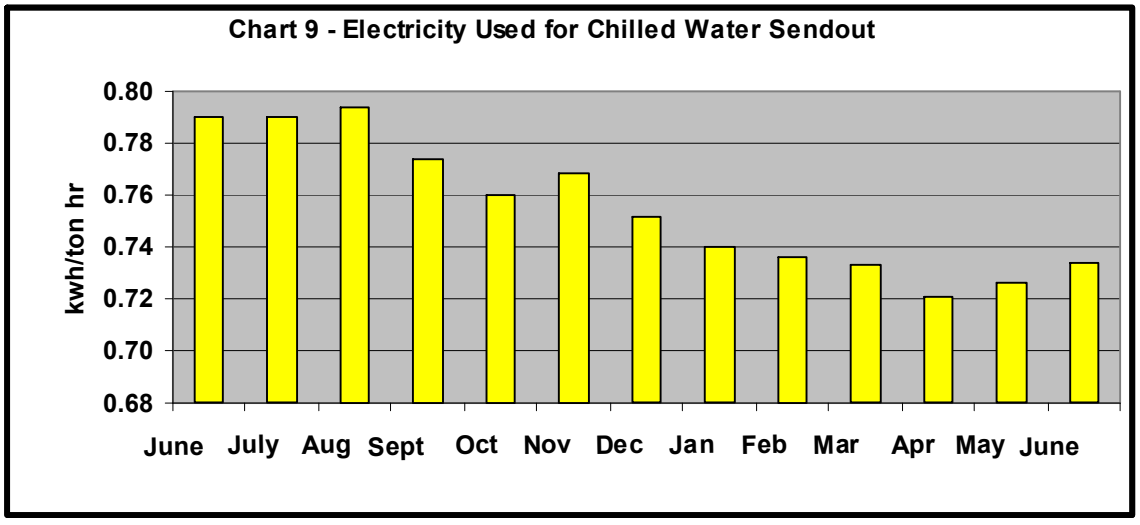


Chart 9 - Electricity Used for Chilled Water Sendout
kwh/ton hr
0.80
0.78
0.76
0.74
0.72
0.70
0.68
June
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June

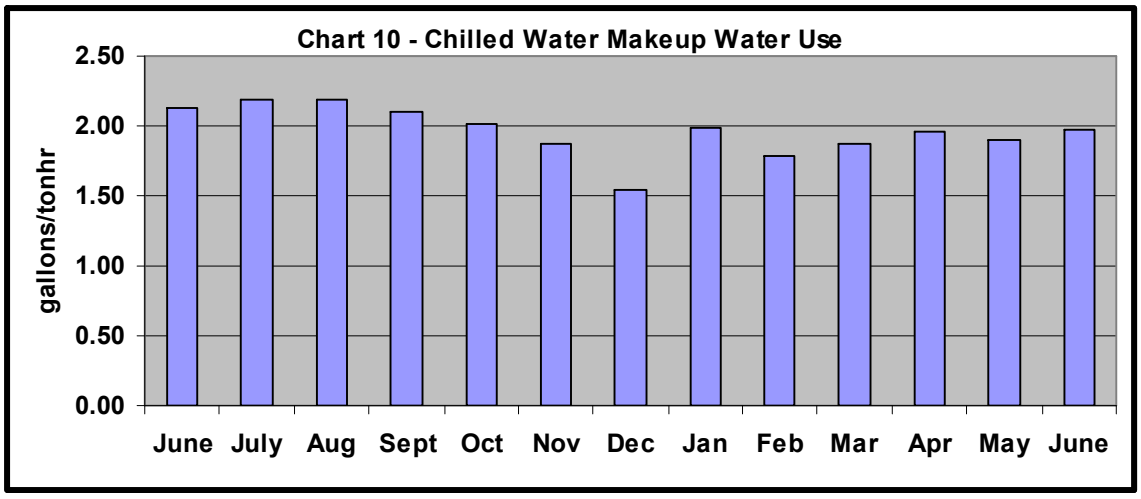


Chart 10 - Chilled Water Makeup Water Use
gallons/tonhr
2.50
2.00
1.50
1.00
0.50
0.00
June
July
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
June

SECTION 5 MONITORING REPORT RECOMMENDATIONS

Item No.	Audit Report Deficiencies	Issue Reported	Priority	Resolution	Issue Resolved	Open / Closed
	Metering					
M-1	**Customer meter accuracy has been reported as an issue since EGF startup.**			A customer meter replacement program has been approved with expected completion in 2006.		Open pending program completion
	Condensate					
C-1	**Failure to return the goal of 60% condensate has been reported as an issue since EGF startup with recommendation to prioritize repair of condensate leaks.**			NDE is proposing a decision process to be followed in evaluating condensate leaks. CNDE has provided recommendations to Metro for setting policy.		Open
	Structure					
		none				
	Operations					
O-1	**Recommended that NDE collect pressure and flow data throughout the CHW distribution system. Data to be used in hydraulic analysis.**		B	Pending completion of the meter replacement program		Open
O-3	**Remote reading billing procedure**	10/19/05	A			Open
	Safety					

Item No.	Audit Report Deficiencies	Issue Reported	Priority	Resolution	Issue Resolved	Open / Closed
	Maintenance					
		none				